

OILFIELD RESEARCH LABORATORIES

536 NORTH HIGHLAND - CHANUTE, KANSAS 66720 - PHONE (316) 431-2650

February 23, 1981

Moore Oil Company
P. O. Box 6122
Leawood, Kansas 66206

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Wilson Lease, Well No. 104, located in Miami County, Kansas and submitted to our laboratory on December 30, 1980.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/kas

5 c to Leawood, Kansas

- REGISTERED ENGINEERS -

CORE ANALYSIS - WATER ANALYSIS - REPRESSURING ENGINEERING - SURVEYING & MAPPING - PROPERTY EVALUATION & OPERATION

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Moore Oil Company Lease Wilson Well No. 104

Location _____

Section 26 Twp. 26S Rge. 21E County Miami State Kansas
16

Elevation, Feet - - - - -

Name of Sand - - - - -	Squirrel
Top of Core - - - - -	672.0
Bottom of Core - - - - -	695.0
Top of Sand - - - - -	672.0
Bottom of Sand - - - - -	694.8
Total Feet of Permeable Sand - - - - -	18.0
Total Feet of Floodable Sand - - - - -	8.3

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Feet

Cum. Ft.

0 - 20	8.1	8.1
20 - 40	7.9	16.0
50 & Above	2.0	18.0

Average Permeability Millidarcys - - - - -	26.4
Average Percent Porosity - - - - -	19.4
Average Percent Oil Saturation - - - - -	51.9
Average Percent Water Saturation - - - - -	41.9
Average Oil Content, Bbls./A. Ft. - - - - -	781.
Total Oil Content, Bbls./Acre - - - - -	14,064.
Average Percent Oil Recovery by Laboratory Flooding Tests - - - - -	7.6
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - -	116.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - -	961.
Total Calculated Oil Recovery, Bbls./Acre - - - - -	- See "Calculated Recovery" Section

-2-

The core was sampled and the samples sealed in plastic bags by a representative of the client. Salt water was used as a drilling fluid.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
672.0 - 679.7	Dark brown calcareous sandstone containing a vertical fracture.
679.7 - 680.3	Hard gray limestone.
680.3 - 690.6	Brown sandstone.
690.6 - 691.8	Brown and gray laminated sandstone and shale.
691.8 - 694.8	Brown sandstone.
694.8 - 695.0	Gray shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 961 barrels of oil per acre was obtained from 8.3 feet of sand. The weighted average percent oil saturation was reduced from 51.1 to 43.5, or represents an average recovery of 7.6 percent. The weighted average effective permeability of the samples is 1.02 millidarcys, while the average initial fluid production pressure is 33.3 pounds per square inch (See Table V).

-3-

By observing the data given in Table IV, you will note that of the 14 samples tested, 6 produced water and oil, and 1 sample produced water only. This indicates that approximately 43 percent of the sand represented by these samples is floodable pay sand.

CALCULATED RECOVERY

It would appear from a study of the core data, that efficient primary and waterflood operations in the vicinity of this well should recover approximately 1,840 barrels of oil per acre. This is an average recovery of 222 barrels per acre foot from 8.3 feet of floodable sand analyzed in this core.

These recovery values were calculated using the following data and assumptions:

Original formation volume factor, estimated	1.04
Reservoir water saturation, percent, estimated	25.0
Average porosity, percent	20.0
Oil saturation after flooding, percent	43.5
Performance factor, percent, estimated	50.0
Net floodable sand, feet	8.3

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Moore Oil Company Lease Wilson Well No. 104

Sample No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbbls. / A Ft.	Perm., Mill.	Feet of Sand		Total Oil Content	Perm. Capacity Ft. X md.
			Oil	Water	Total			Ft.	Cum. Ft.		
1	672.7	21.6	47	52	99	788	54.	1.0	1.0	788	54.00
2	673.5	20.0	60	36	96	931	19.	1.5	2.5	1397	28.50
3	675.5	21.1	60	33	93	982	19.	1.5	4.0	1473	28.50
4	677.7	12.1	56	35	91	526	18.	1.0	5.0	526	18.00
5	679.6	13.3	45	48	93	464	30.	1.2	6.2	557	36.00
6	681.1	18.5	59	29	88	847	39.	1.7	7.9	1440	66.30
7	683.4	21.7	45	51	96	758	26.	1.5	9.4	1137	39.00
8	685.7	20.8	44	49	93	710	38.	1.5	10.9	1065	57.00
9	687.5	20.5	45	52	97	716	13.	1.5	12.4	1074	19.50
10	688.4	18.7	49	50	99	711	9.2	1.0	13.4	711	9.20
11	690.3	19.1	54	44	98	800	10.	1.6	15.0	1280	16.00
12	692.4	20.9	45	45	90	730	27.	1.0	16.0	730	27.00
13	693.7	21.0	61	34	95	994	23.	1.0	17.0	994	23.00
14	694.5	20.9	55	29	84	892	54.	1.0	18.0	892	54.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Moore Oil Company	Lease	Wilson	Well No.	104	
	Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.		
	672.0 - 694.8	18.0	26.4	476.00		
	Depth Interval, Feet	Feet of Core Analyzed	Average Percent Porosity	Average Percent Oil Saturation	Average Percent Water Saturation	Total Oil Content Bbls./Acre
	672.0 - 694.8	18.0	19.4	51.9	41.9	14,064

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Well No. 104

Lease Wilson

Moore Oil Company

Company

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation		Volume of Water Recovered cc*	Effective Permeability Millidarcys**	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water			
1	672.7	21.7	47	791	0	0	47	52	24	0.90	25
2	673.5	20.0	60	931	0	0	60	34	0	Imp.	-
3	675.5	21.6	59	989	0	0	59	35	0	Imp.	-
4	677.7	12.2	56	530	0	0	56	37	0	Imp.	-
5	679.6	12.9	46	460	0	0	46	47	0	Imp.	-
6	681.1	18.6	59	851	10	144	49	46	6	0.17	45
7	683.4	21.7	45	758	5	84	40	56	14	0.90	25
8	685.7	20.9	44	713	5	81	39	55	14	0.75	30
9	687.5	20.5	45	716	0	0	45	53	11	0.56	40
10	688.4	18.8	49	715	9	131	40	59	29	0.60	30
11	690.3	19.2	54	804	8	119	46	52	4	0.17	45
12	692.4	20.4	46	728	0	0	46	46	0	Imp.	-
13	693.7	21.4	60	996	0	0	60	35	0	Imp.	-
14	694.5	21.0	55	896	9	147	46	44	258	4.80	25

Notes: cc—cubic centimeter.

*—Volume of water recovered at the time of maximum oil recovery.

**—Determined by passing water through sample which still contains residual oil.

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SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Moore Oil Company	Lease	Wilson	Well No.	104
Depth Interval, Feet	672.0 - 694.8				
Feet of Core Analyzed	8.3				
Average Percent Porosity	20.0				
Average Percent Original Oil Saturation	51.1				
Average Percent Oil Recovery	7.6				
Average Percent Residual Oil Saturation	43.5				
Average Percent Residual Water Saturation	51.9				
Average Percent Total Residual Fluid Saturation	95.4				
Average Original Oil Content, Bbls./A. Ft.	789.				
Average Oil Recovery, Bbls./A. Ft.	116.				
Average Residual Oil Content, Bbls./A. Ft.	673.				
Total Original Oil Content, Bbls./Acre	6,551.				
Total Oil Recovery, Bbls./Acre	961.				
Total Residual Oil Content, Bbls./Acre	5,590.				
Average Effective Permeability, Millidarcys	1.02				
Average Initial Fluid Production Pressure, p.s.i.	33.3				

NOTE: Only those samples which recovered oil were used in calculating the above averages.

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RESULTS OF WATER DIFFERENTIATION TESTS

TABLE VI

Company Moore Oil Company Lease Wilson Well No. 104

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation Connate Drilling & Foreign	Total
1	672.7	19,539		
2	673.5	36,013		
3	675.5	35,063		
4	677.7	45,549		
5	679.6	34,166		
6	681.1	54,869		
7	683.4	35,871		
8	685.7	26,133		
9	687.5	32,705		
10	688.4	29,799		
11	690.3	38,516		
12	692.4	27,067		
13	693.7	32,456		
14	694.5	36,829		

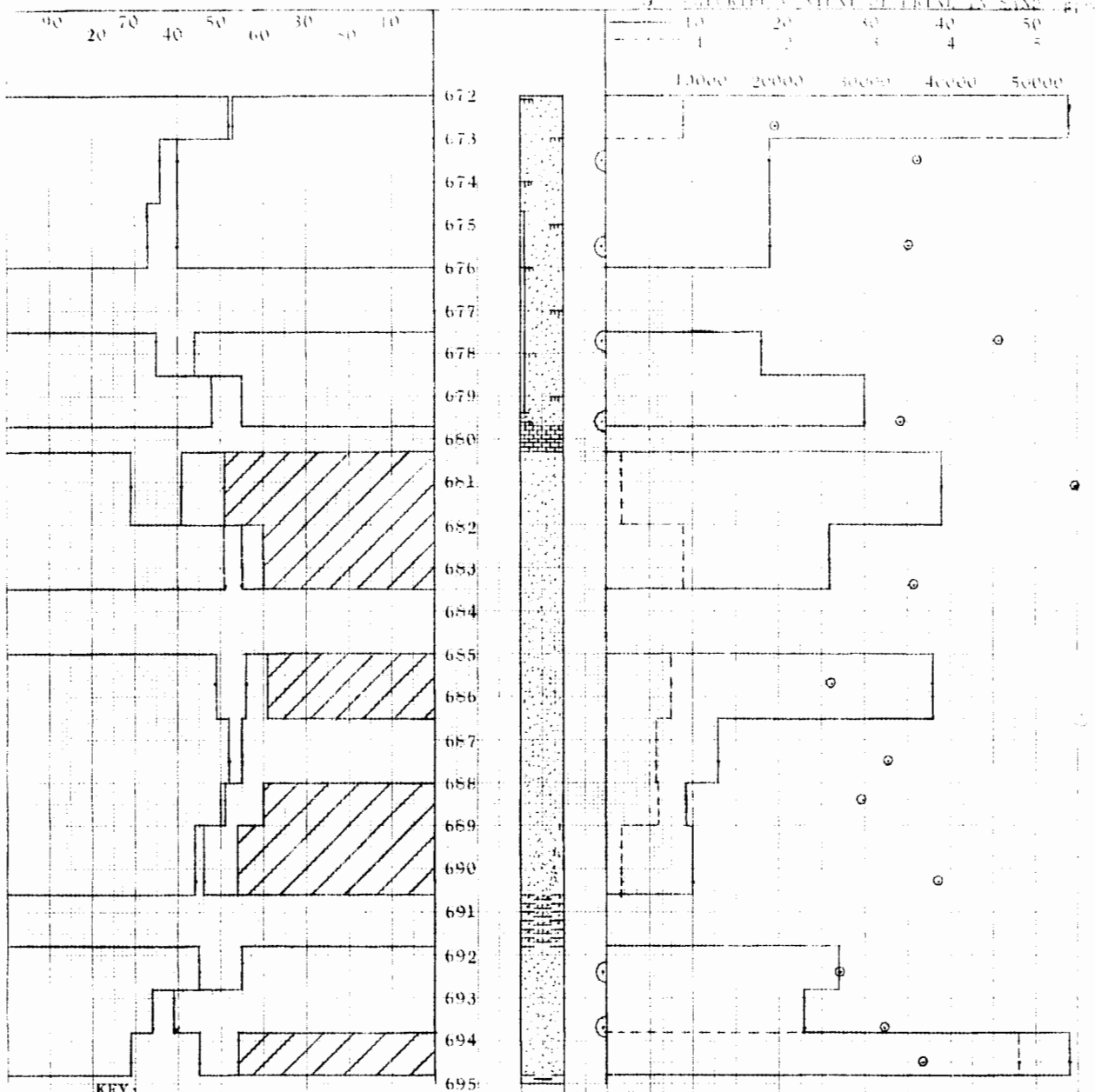
Note: ppm — parts per million

WATER SATURATION
PERCENT

WATER SATURATION
PERCENT

PERMEABILITY, MILLIDARCYS
EFFECTIVE PERMEABILITY TO WATER, IN
MULTIDARCYS

PERMEABILITY, MILLIDARCYS, SANDSTONE



KEY:



SHALE



SANDSTONE



LIMESTONE



CALCAREOUS SANDSTONE



LAMINATED SANDSTONE AND SHALE



FORMATION WITH VERTICAL FRACTURE



FLOODPOT RESIDUAL OIL SATURATION



IMPERMEABLE TO WATER

MOORE OIL COMPANY

WILSON LEASE

MIAMI COUNTY, KANSAS

WELL No. 104

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCYS	CALCULATED OIL RECOVERY, BBLs. / ACRE
672.0 - 694.8	18.0	19.4	51.9	41.9	26.4	1840

(PRIMARY AND
WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
FEBRUARY, 1981

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